Visvesvaraya Technological University, Belagavi.

PROJECT REPORT

on

"ASSISTANCE FOR ELDERLY PEOPLE"

Project Report submitted in partial fulfillment of the requirement for the award of the degree of

Bachelor of Engineering

in

Electronics and Communication Engineering

For the academic year 2017-18

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CERTIFICATE

This is to Certify that the dissertation work **"ASSISTANCE FOR ELDERLY PEOPLE"** carried out by Anjan Kumar N(1CR14EC025), ArunKumar V(1CR14EC031), Bharath S(1CR14EC039) bonafide student of **CMRIT** in partial fulfillment for the award of **Bachelor of Engineering** in **Electronics and Communication Engineering** of the **Visvesvaraya Technological University, Belagavi,** during the academic year **2017-18**. It is certified that all corrections/suggestions indicated for internal assessment have been incorporated in the report deposited in the departmental library. The project report has been approved as it satisfies the academic requirements in respect of Project work prescribed for the said degree.

Signature of Guide	Signature of HOD	Signature of Principal
Mr. Sunil Kumar k H Assistant professor, Dept. of E&C Engg., CMRIT, Bangalore.	Mrs. Pappa M. Head of the Department, Dept. of E&C Engg, CMRIT, Bangalore.	Dr. Sanjay Jain Principal, CMRIT, Bangalore.

External Viva

Name of Examiners	Signature & date
1.	
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Abstract:

Most of the elders have multiple chronic illness, and they use drugs to stabilize their health status. Pharmacists Association urged the families should be more concerned on medication safety of the elders. Thus, this project designs an intelligent pill box and its back-end monitoring system. The implemented pill box can remind the elders to take medicine on time and can inform the families remotely when the elders take the medicine. The safety designs of the pill box can prevent the drugs abusing. The caretakers can easily schedule the time for elders to take medicine. Along with the intelligence pill box, in this project we provide a few keys to assist the elders in case of any needs.

This is done by implementing of portable voice-based authentication system by using GSM with the help of Raspberry PI. Existing methods are expensive and also speech recognition is available with different techniques but here we are using GSM and monitor for speech recognition technology and Raspberry PI for for controlling purpose.

ACKNOWLEDGEMENT

The satisfaction and euphoria that accompany the successful completion of any task would be incomplete without the mention of people who made it possible, whose consistent guidance and encouragement crowned our efforts with success.

We consider it as our privilege to express the gratitude to all those who guided in the completion of the project.

We express our gratitude to Principal, **Dr. Sanjay Jain,** for having provided us the golden opportunity to undertake this project work in their esteemed organization.

We sincerely thank **Pappa M.,** HOD**,** Department of Electronics and Communication Engineering, CMR Institute of Technology for the immense support given to us.

We express my gratitude to our project guide **SUNIL KUMAR K.H.,** Assistant professor, Department of Electronics and Communication Engineering, for their support, guidance and suggestions throughout the project work.

Last but not the least, heartful thanks to our parents and friends for their support.

Above all, We thank the Lord Almighty for His grace on us to succeed in this endeavor.

Anjan Kumar N
ArunKumar V
Bharath S

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Chapter 1

INTRODUCTION

1.1 Preamble:

The proposed project will support the development of elderly care system and home based elderly care services and facilities. Elderly care is the fulfillment of the special needs and requirements that are unique to senior citizens. People with disabilities need an assistive mechanism to remind things, schedules and assist in medicine identification at defined time on regular basis. This project encompasses such service which includes the assistance for daily activity and health care. It promotes independence in self care and provides the adults the capability to take care some of their basics daily activities. These services can be integrated to form a system which uses Raspberry Pi model as its main hardware part.

The main elements of this project are Raspberry Board, GSM module. Here Raspberry works for controlling purpose and GSM module is for communication unit. The Speakers are used for voice output for the system. The Raspberry Pi is a low cost, credit-card sized computer that plugs into a computer monitor or TV that uses a standard keyboard and mouse. It is a capable little device that enables people of all ages to explore computing, and to learn how to program in languages like Scratch and Python. It's capable of doing everything you'd expect a desktop to spreadsheets, word-processing, and playing games.

This project imbibes the Raspberry Pi board with the GSM module, RF transmitter and receiver, IR sensors and some help keys to provide help to the elderly person to perform his day to day activities.

1.2 Purpose:

Nowadays, it is very complicated issue to maintain each patient manually, taking care and monitoring patient continuously in places like ICU's or home, it is not possible at all times. These issues can be overcome using this proposed project where the services are provided to the patients only when required. With the help of this project there is a reduction in human labor and errors due to human negligence. This is the cost effective method compared to the other techniques. The purpose of this system is to enhance the independence and autonomy of elderly people in indoor and outdoor environment by offering faster assistance in emergency situations through services offered by volunteers.

Chapter 2

Literature Survey

2.1 System Study:

Old-aged people, Alzheimer's affected ones, persons with locomotive problems always need an attention. If they skip their medicines, it will affect the health condition of that particular person. Consider old-age people living alone, they should take care of themselves. Even if they fall down they may not get any assistance unless someone notices it. It may take a long time since no one will be around. This may lead to critical situation.

With a rapid population ageing that is occurring worldwide, there is increasing interest in technologies that can assist older people to continue living at home with safety and independence. Many ideas have been proposed for this.

Nearly 7% of the world's population is now over 65 years of age. The population of older people is predicted to raise approximately 20% by 2050 worldwide. The increasing number and proportion of older people require a great focus on policies and resources to meet their needs.

Recently, there has been an increasing demand on developing elderly care services utilizing novel technologies, with the aim of providing independent living. Internet of Things(IoT), as an advanced paradigm to connect physical and virtual things for enhanced services, has been introduced that can provide significant improvements in remote elderly monitoring. Several efforts have been recently devoted to address elderly care requirements utilizing IoT-based systems. In IoT-based system, we use microcontroller which requires extra interface for voice output. Also, IoT based systems are costly and they also require good internet connectivity. Contradictory to this, Raspberry PI has inbuilt audio jack and it also has inbuilt camera which can be used for various purposes.

2.2 Features:

- Instant maintenance of elderly people's requirements.
- It is used on real time basis.

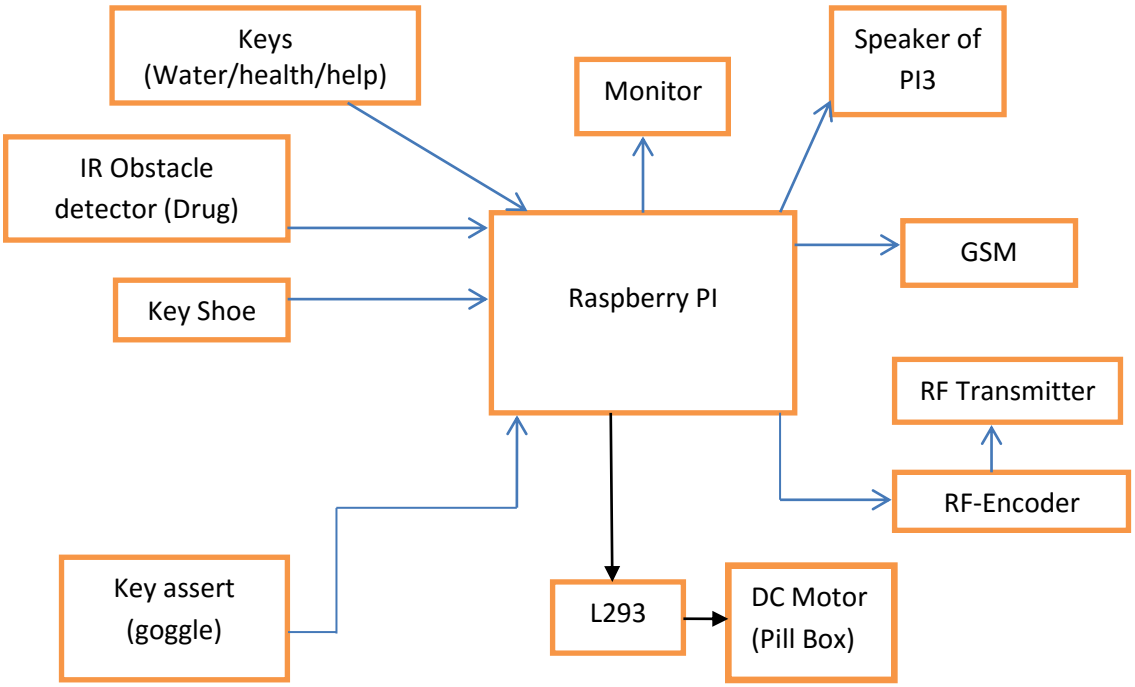
2.3 Constraints:

- This system is highly dependent on sensor's accuracy.
- Dependent on human intervention.

Chapter 3

System Architecture

3.1 Block Diagram:



Assert Unit:

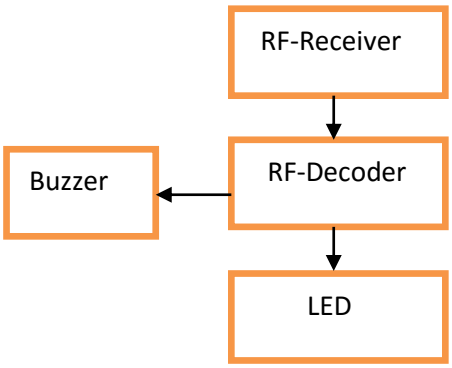


Figure 3.1- Block Diagram

3.2 Description:

In this project we are developing a model which helps in instant maintenance of the patient requirements. This project has been built as a prototype keeping in the mind of today's busy life. As family members are immensely involved in their busy scheduled life and stay out of the house most of the time, henceforth the elderly people are circumstanced to stay alone at home and do their basic activities. Accordingly, senior's ability to live independently and comfortably for as long as possible and thus give their family members a peace of mind, is implemented.

Demonstration of the project

When the power is ON, the system gets configured and GSM is initialized and enabled for the communication purpose. Once the GSM is initialized the message is sent to the caretaker indicating the initialization.

Drug consumption: The next step is to set the drug timing to the Raspberry Pi, in turn the alarm depends on the scheduled time which indicates the time for the consumption of the drug. On the occurrence of this event the person will go near to the drug rack. The IR sensor used here is placed on the drug rack. As the person reaches the drug rack to consume his drugs the IR sensor senses the patient as an obstacle and states that the drug is being consumed. Incase if the drug is not consumed there is voice output saying drug is not being consumed. Further, a message is also sent to the caretaker. On the other hand, the patient will come to know which set of tablets has to be consumed at the scheduled time.

The keys are placed in the system to maintain the patient requirement. Here we can add more number of keys as needed. The keys which we have included are

- Help key
- Water key
- Shoe key
- Assert key

Help key: Pressing this key gives voice as an output through the speakers indicating the patient needs some sort of aid.

Water key: Pressing this key gives voice as an output through the speakers indicating the patient needs water.

Shoe key: Many elderly people are often intended to forget the necessary thing while stepping out of the house. In that case this key is used to remind the person about the necessary things to be taken while stepping out of the house.

Assert key: Pressing this key intimates the caretaker that patient is in some trouble. Caretaker will have a buzzer, which will ring when the key is pressed.

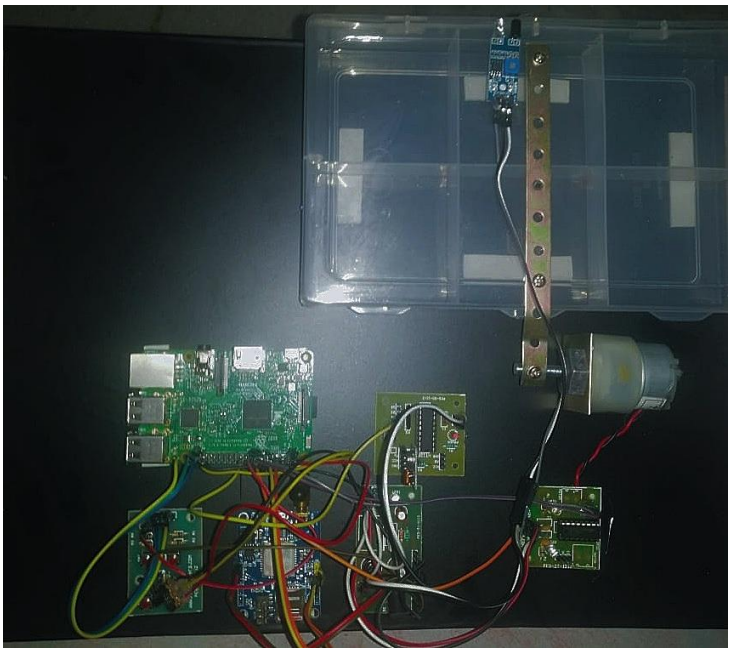
Chapter 4

Design and Implementation

4.1 Hardware used:

1. Raspberry PI-3
2. GSM module
3. Speakers
4. RF transmitter and receivers
5. Keys
6. Piezoelectric buzzer
7. DC Motor
8. IR Sensor

4.2 Working Model:



4.3 Hardware Implementation:

4.3.1 Raspberry Pi 3 Model:

1. Specs are as follows
   Memory : 512 Mb RAM.
   Connections: 2 USB ports.
2. To run the operating system, programs and storing multimedia content, an SD card 8 GB.
3. This powerful credit-card sized single board computer can be used for many applications and supersedes the original Raspberry Pi Model.
4. **Key Benefits:**
   - Low cost
   - Consistent board format
   - 10x faster processing
   - Added connectivity

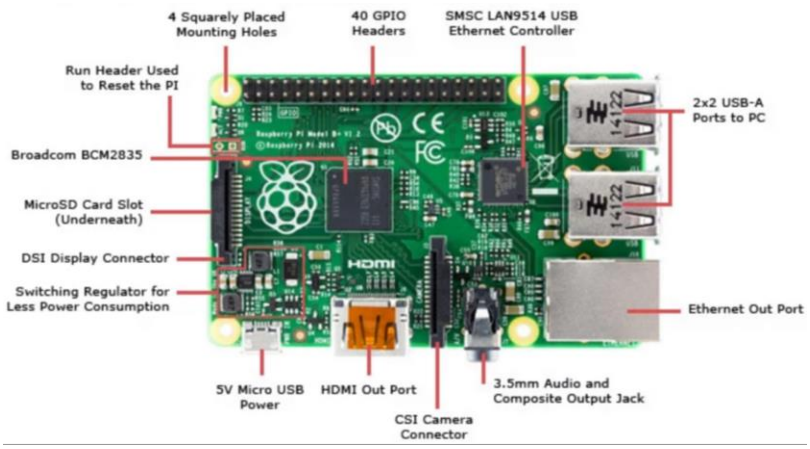


Figure 4.1- RASPBERRY PI3 Board Specification

4.3.2 GSM Module:

1. GSM is utilized to wireless communication.
2. If drug consumer did not consume drugs within some time an alert message will be sent to care taker using GSM.
3. Then caretaker will take some necessary actions.
4. First insert the SIM card to the GSM Module,
5. Connect the Serial cable –RS232 to the PC via DB9 pin connector on the GSM Module.

Figure 4.2- SIM800 GSM Module

4.3.3 Speakers:

1. Loud speaker (or "speaker") is an electro acoustic transducer that produces sound in response to an electrical audio signal input.
2. The implementation of portable voice-based authentication system this speakers are used.
3. The elderly persons will get notified about drug consumption via speaker voice output as drug remainder alarm.
4. Along with this other help can be asked through voice output through speakers with given keys.

Figure 4.3- Speakers

4.3.4 RF Transmitter And Receiver:

1. The asset unit contains the RF receiver and transmitter.
2. The RF module operates at radio frequency. The corresponding frequency range varies between 30KHz and 300GHz.
3. The RF transmitter modules are usually applied along with a microcontroller, which will offer data to the module which can be transmitted.
4. The RF receiver module takes the modulated RF signal to demodulate it.

Transmitter:

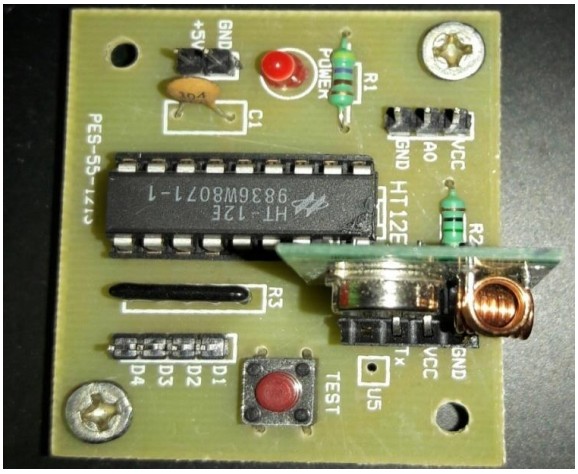
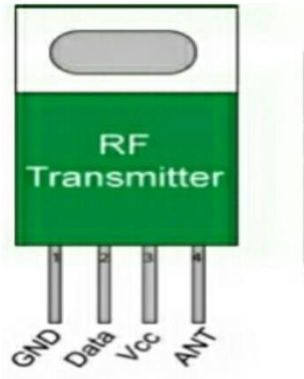


Figure 4.4- RF Transmitter



Pin No	Function	Name
1	Ground (0V)	Ground
2	Serial data input pin	Data
3	Supply voltage; 5V	Vcc
4	Antenna output pin	ANT

Pin diagram of RF transmitter and it's details

Some of the features of transmitter are,

- Frequency: 433.92MHz
- Modulation: AM
- Operating voltage: 4.5 – 5.5 VDC
- Output: Digital & Linear

Receiver:

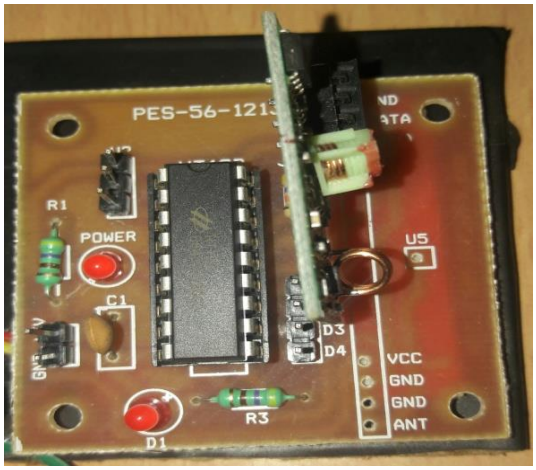
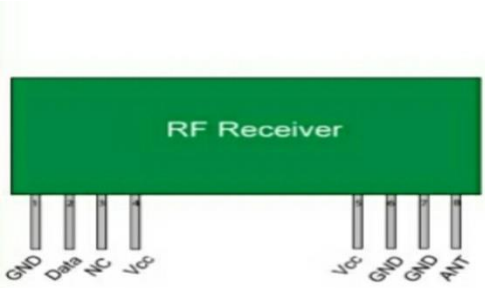


Figure 4.5- RF Receiver



Pin No	Function	Name
1	Ground (0V)	Ground
2	Serial data output pin	Data
3	Linear output pin; not connected	NC
4	Supply voltage; 5V	Vcc
5	Supply voltage; 5V	Vcc
6	Ground (0V)	Ground
7	Ground (0V)	Ground
8	Antenna input pin	ANT

Pin diagram of RF receiver and it's details

Some of the features of receiver are,

- Frequency: 433.92MHz
- Modulation: AM
- Operating voltage: 4.5 – 5.5 VDC
- Output: Digital & Linear

4.3.5 Keys:

1. KEYS are used to select the assets.
2. The keys are placed in the system to maintain the patient requirement. Here we can add more number of keys as needed. The keys which we have included are
    - Help key
    - Water key
    - Shoe key
    - Assert key
3. Pressing this key gives voice as an output through the speakers indicating the patient needs some sort of aid.

Figure 4.6- Keys

Some of the features of keys are:

- Current Rating: 50mA
- Voltage Rating: 12VDC
- Size: Approx. 6x6x6mm
- Insulating Resistance: >100M ohm 250V DC

4.3.6 Piezoelectric buzzer:

1. A buzzer or beeper is an audio signaling device, which may be mechanical, electromechanical or piezoelectric.
2. BUZZER is utilized to indicate voice output.
3. Pressing assert key intimates the caretaker that patient is in some trouble.
4. Caretaker will have a buzzer, which will ring when the key is pressed.

Figure 4.7- Buzzer

Specifications:

- Rated Voltage: A piezoelectric buzzer is driven by square waves (V p-p).
- Operating Voltage: For normal operating. But it is not guaranteed to make the minimum SPL under the rated voltage.

4.3.7 DC Motor:

1. Basic operation is to open the pill box automatically when it is time to consume drugs when alarm rings.
2. DC Motor used is L293.
3. The L293 is an integrated circuit motor driver that can be used for simultaneous, bidirectional control of two small motors.
4. It automatically closes pill box after particular time is reached.

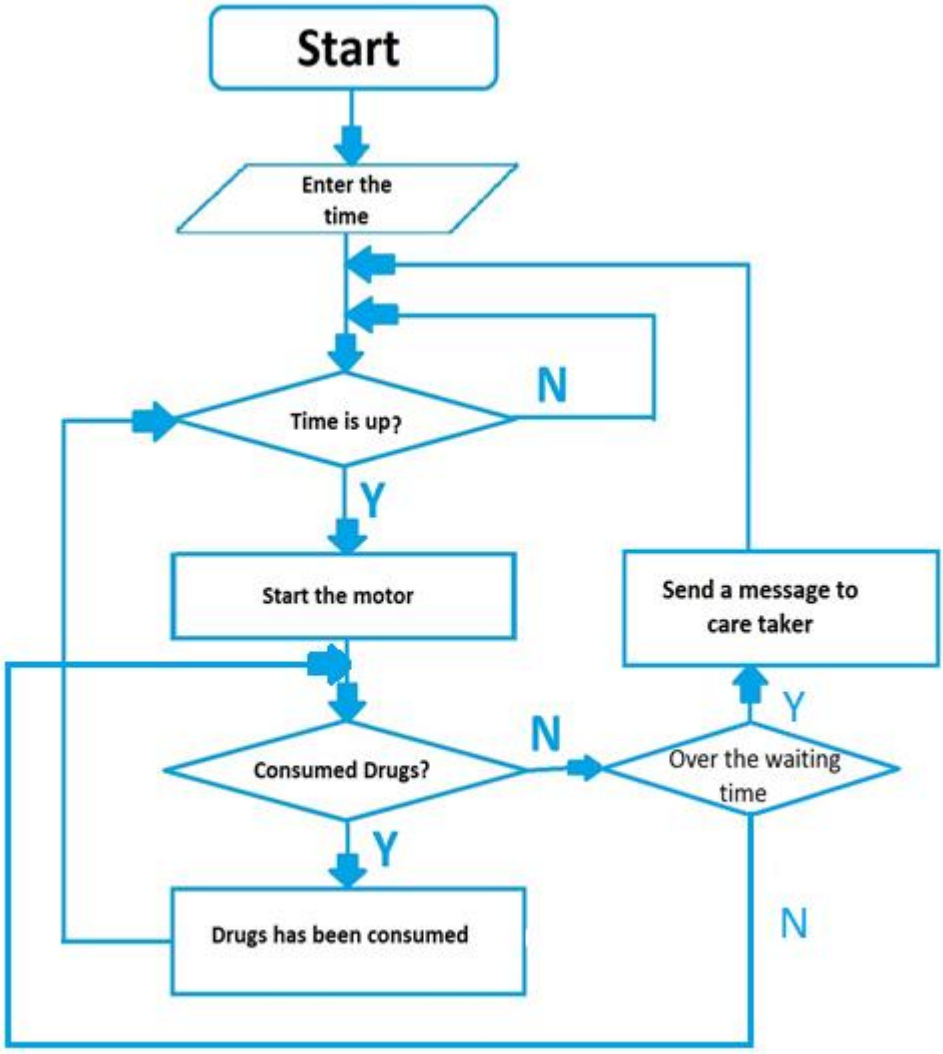
Figure 4.8- 12v 100 rpm DC Geared Motor

4.4 Software Used:

4.4.1 Software tool:

- Python

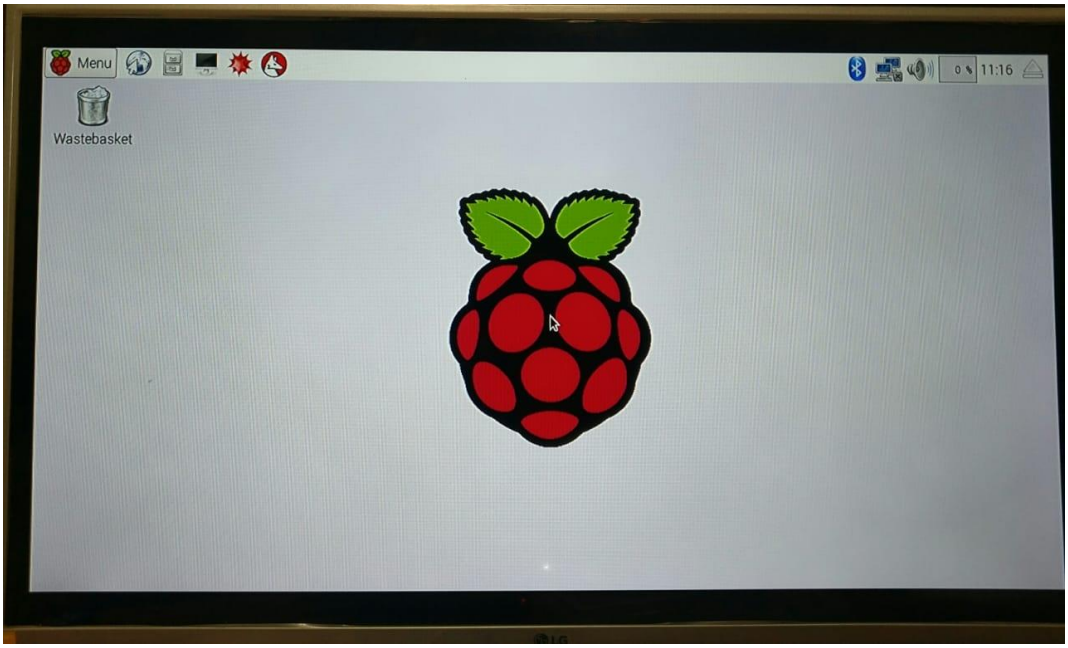
4.4.2 Software implementation:



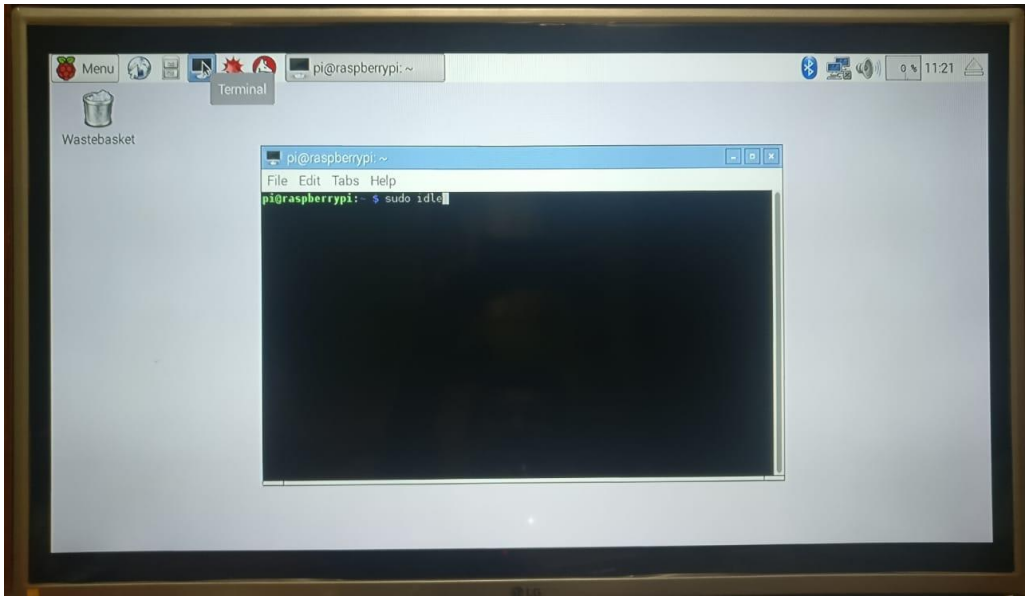
Chapter 5

Results:

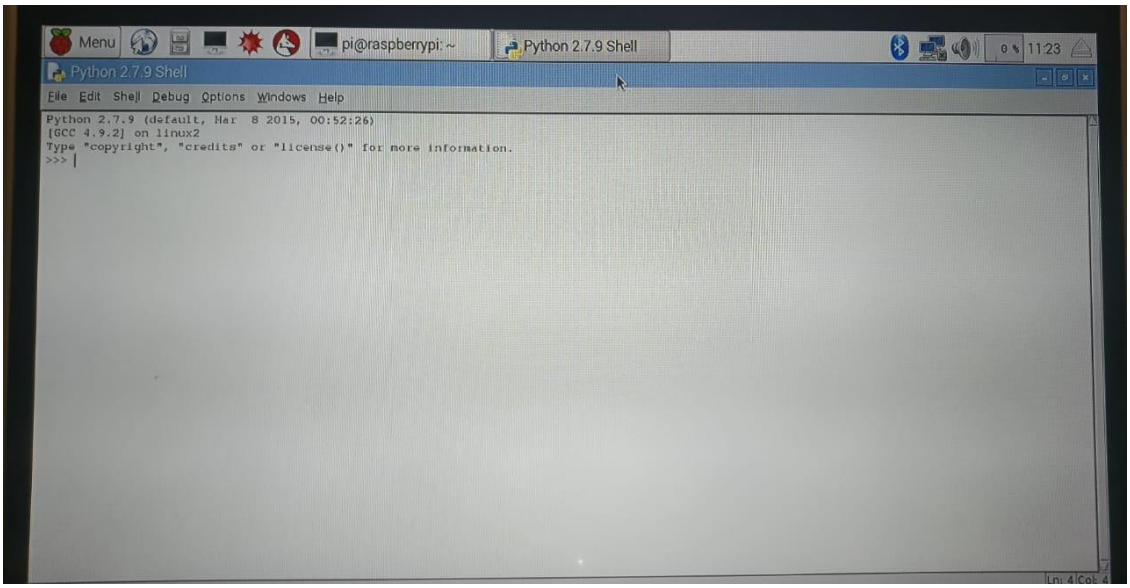
5.1 Steps to run the code:



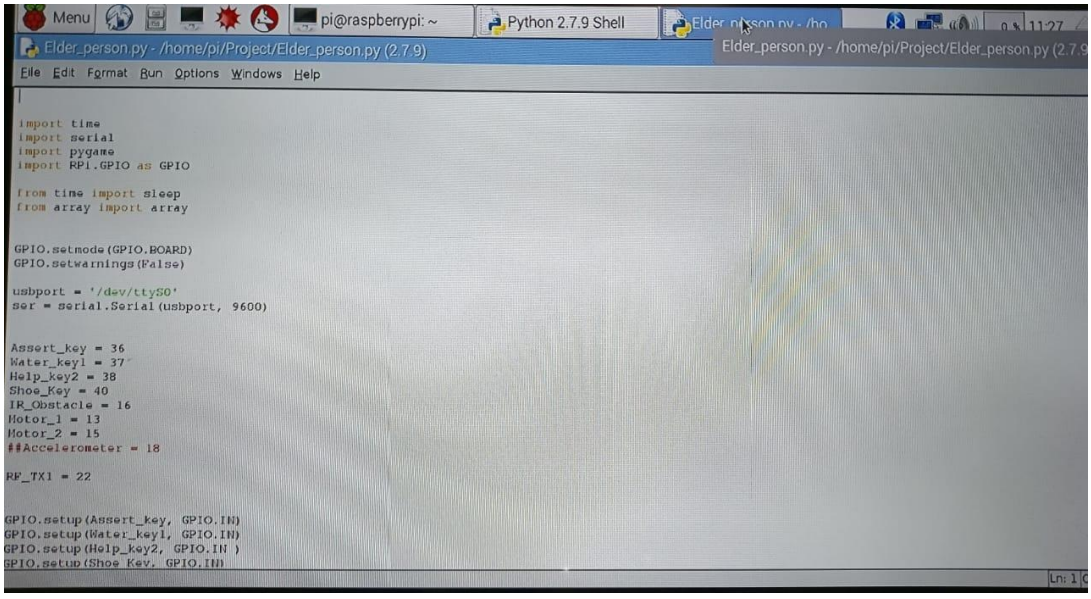
Step1: Initial screen when PI board is powered up



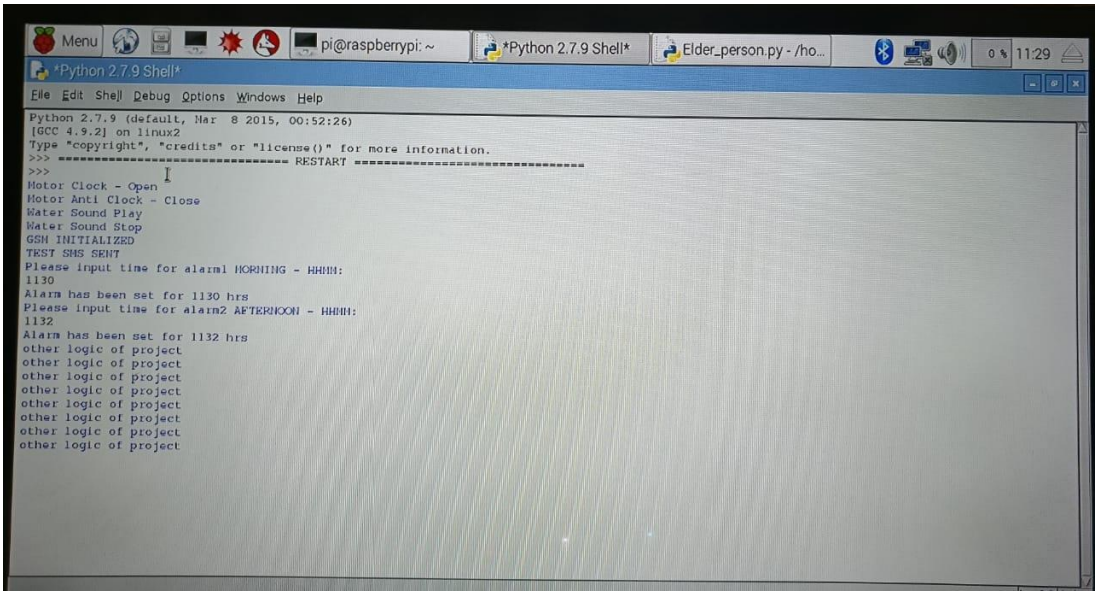
Step 2: Click on the Terminal and then type – **sudo idle**



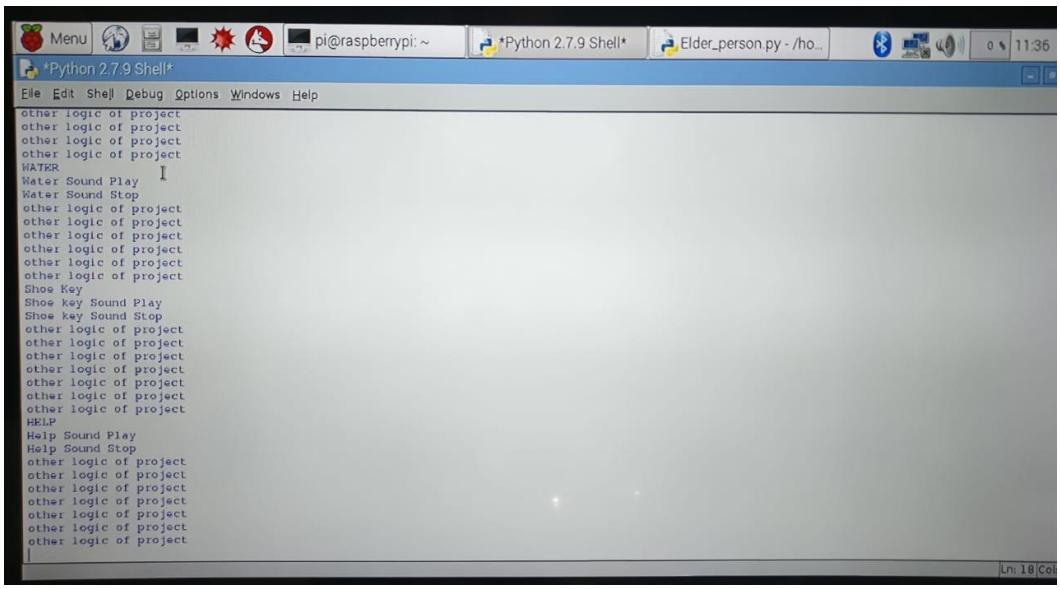
Step 3: Display of Python 2.7.9 Shell screen



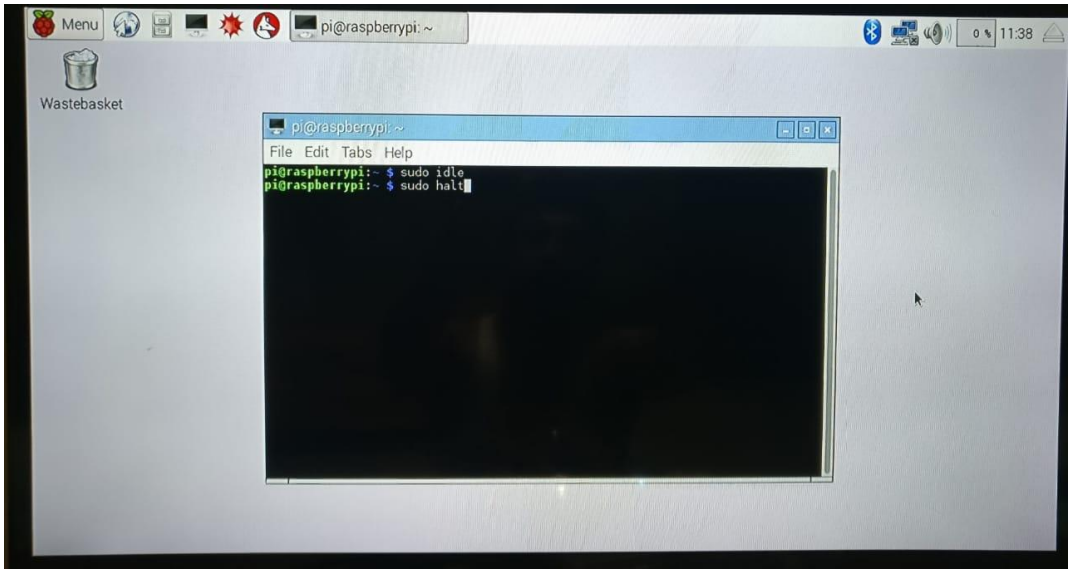
Step 4: Click on File and select saved code



Step 5: Set the alarm timings, morning as well as afternoon to remind to take the tablets.



Step 6: Other logics such as help key, water key are implemented as required



Step 7: To close the Raspberry Pi type – **sudo halt**

Chapter 6

Advantages

- Fidelity of the system is more.
- Reduces manual efforts.
- Can also be used to monitor provide health status of the human.
- Low cost, high reliable.
- Very compact device, so we can easily fit into required place.

Applications

- In Medical applications to detect motion.
- Helpful device for senior citizens.
- This unit can be used by physically challenged people.
- Efficient and reliable process to monitor changes in environment conditions and ensure security of the old person.

Chapter 7

Conclusion and Future-Scope

7.1 Conclusion:

There are promising examples of how elderly people can be assisted. This proposed prototype operates on premise that technology integration has great potential to promote the stress free life for the caregivers and also enhance the services required by the old age people. This prototype also houses the idea that there exists powerful potential to advance intense care of disables by facilitating the audio output and communication and reducing severity of the problems through the use of Raspberry PI as the main hardware component on which the whole system is working on , as well as the GSM technology to ensure proper communication. And we conclude that this prototype has been successfully analyzed and tested and will have the vigorous impact on old age people.

7.2 Future Work:

- In future, automatic maintenance of the elders and physically disabled peoples with Raspberry PI Module can be implemented which can further reduce the time consumption and the system should be able to interface with many sensor like temperature sensor etc.
- The camera interface can also be used in order to continuously monitor the patient's activities to avail the security purpose.
- To make this project as user friendly and durable, we need to make it integrated and cost effective and administering further advance technology, thereby reducing the size of the system.

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[3] B. Chowdhury and R. Khosla, " Real-timePatient Management System," in *proceeding of 6th IEEEInternational Conference on Computer and Information Science*,Melbourne, Australia, pp. 363 - 368, July, 2007.

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APPENDIX

Software Code:

```
import time
import serial
import pygame
import RPi.GPIO as GPIO

from time import sleep
from array import array

GPIO.setmode(GPIO.BOARD)
GPIO.setwarnings(False)

usbport = '/dev/ttyS0'
ser = serial.Serial(usbport, 9600)

Assert_key = 36
Water_key1 = 37
Help_key2 = 38
Shoe_Key = 40
IR_Obstacle = 16

GPIO.setup(Assert_key, GPIO.IN)
GPIO.setup(Water_key1, GPIO.IN)
GPIO.setup(Help_key2, GPIO.IN )
GPIO.setup(Shoe_Key, GPIO.IN)
```

```
GPIO.setup(IR_Obstacle, GPIO.IN)
UART_Rx_Str = ""
Drug_Alarm_Flag = 0
GPIO.output(RF_TX1, True)
sleep( 2 )
GPIO.output(RF_TX1, False)
sleep( 2 )

##pygame.mixer.init()
##pygame.mixer.music.load('1water.mp3')
##print "Water Sound Play"
##pygame.mixer.music.play()
##sleep(10)
##pygame.mixer.music.stop()
##print "Water Sound Stop"

ser.write("AT\r")
print "GSM INITIALIZED"
sleep( 2 )
ser.flushInput()

ser.write("AT+CNMI=2,2,0,0,0\r")
print "GSM RX ENABLED"

sleep( 2 )
ser.flushInput()

def GSM_Send_SMS( Mobile, SMS ):
ser.write( "AT+CMGS=\"" )
```

```
ser.write( Mobile )
ser.write( "\"\r" )
sleep( 2 )
ser.write( SMS )
ser.write( "\x1A" )
sleep( 4 )

GSM_Send_SMS( "8050218191", "SYSTEM START" )
sleep(2)
ser.flushInput()
print "TEST SMS SENT"

response1 = raw_input("Please input time for alarm1 MORNING
- HHMM: \n")
print("Alarm has been set for %s hrs" % response1)

alarm1 = int(response1)
response2 = raw_input("Please input time for alarm2
AFTERNOON - HHMM: \n")
print("Alarm has been set for %s hrs" % response2)
alarm2 = int(response2)

def Alarm_Scan( ):
# function to continuously check time, buzzer for the set
alarm time
# get time as an integer value
curr_time = int(time.strftime("%H%M"))
Drug_Alarm_Flag = 1
print("Morning Alarm")
```

```
pygame.mixer.init()
pygame.mixer.music.load('3morn_alarm.mp3')
print "Morning Alarm Sound Play"
pygame.mixer.music.play()
sleep(20)
print "waiting"
sleep(20)
pygame.mixer.music.stop()
print "Morning Alarm Sound Stop"

sleep(10)
while True:

if( (GPIO.input(IR_Obstacle) == False) & (Drug_Alarm_Flag
== 1) ):
print("Drug consumed")
sleep(10)
Drug_Alarm_Flag = 0


elif( (GPIO.input(IR_Obstacle) == True) & (Drug_Alarm_Flag
== 1) ):
print("Drug not consumed")
pygame.mixer.init()
pygame.mixer.music.load('8notconsumed.mp3')
print "Drug Not Consumed Sound Play"
pygame.mixer.music.play()
```

```
GSM_Send_SMS( "8050218191", "Drug not consumed, please call
and guide your seniors" )
sleep(2)
ser.flushInput()
print "SMS sent to care taker"

sleep(30)
pygame.mixer.music.stop()
print "Drug Not Consumed Sound Stop"

Drug_Alarm_Flag = 1
print("Afternoon Alarm")

pygame.mixer.init()

pygame.mixer.music.load('4noon_alarm.mp3')
print "Afternoon Alarm Sound Play"
pygame.mixer.music.play()
sleep(20)
print "waiting"
sleep(20)
pygame.mixer.music.stop()
print "Afternoon Alarm Sound Stop"
sleep(10)
while True:
if( (GPIO.input(IR_Obstacle) == False) & (Drug_Alarm_Flag
== 1) ):
print("Drug consumed")
sleep(10)
```

```
Drug_Alarm_Flag = 0

elif( (GPIO.input(IR_Obstacle) == True) & (Drug_Alarm_Flag
== 1) ):
print("Drug not consumed")
pygame.mixer.init()
pygame.mixer.music.load('8notconsumed.mp3')
print "Drug Not Consumed Sound Play"
pygame.mixer.music.play()

GSM_Send_SMS( "8050218191", "Drug not consumed, please call
and guide your seniors" )
sleep(2)

ser.flushInput()
print "SMS sent to care taker"

sleep(30)
pygame.mixer.music.stop()
print "Drug Not Consumed Sound Stop"
Drug_Alarm_Flag = 0
while True:
Alarm_Scan( )
time.sleep(5)
print("other logic of project")

if( GPIO.input(Water_key1) == False ):
print("WATER")
pygame.mixer.init()
```

```
pygame.mixer.music.load('1water.mp3')
print "Water Sound Play"
pygame.mixer.music.play()
sleep(10)

pygame.mixer.music.stop()
print "Water Sound Stop"

if( GPIO.input(Help_key2) == False ):
print("HELP")
pygame.mixer.init()
pygame.mixer.music.load('2help.mp3')
print "Help Sound Play"
pygame.mixer.music.play()
sleep(10)
pygame.mixer.music.stop()
print "Help Sound Stop"

if( GPIO.input(Assert_key) == False ):
print("ASSERT CHECK")
GPIO.output(RF_TX1, True)
pygame.mixer.init()
pygame.mixer.music.load('5assert.mp3')
print "Assert Sound Play"
pygame.mixer.music.play()
sleep(10)
pygame.mixer.music.stop()
GPIO.output(RF_TX1, False)
print "Assert Sound Stop"
```

```
if( GPIO.input(Shoe_Key) == False ):
print("Shoe Key")
pygame.mixer.init()
pygame.mixer.music.load('6Shoe.mp3')
print "Shoe key Sound Play"
pygame.mixer.music.play()
sleep(10)
pygame.mixer.music.stop()
print "Shoe key Sound Stop"
```

RASPBERRY PI 3 Pin diagram details:

Pin#	NAME		NAME	Pin#
01	3.3v DC Power		DC Power 5v	02
03	GPIO02 (SDA1 , I2C)		DC Power 5v	04
05	GPIO03 (SCL1 , I2C)		Ground	06
07	GPIO04 (GPIO_GCLK)		(TXD0) GPIO14	08
09	Ground		(RXD0) GPIO15	10
11	GPIO17 (GPIO_GEN0)		(GPIO_GEN1) GPIO18	12
13	GPIO27 (GPIO_GEN2)		Ground	14
15	GPIO22 (GPIO_GEN3)		(GPIO_GEN4) GPIO23	16
17	3.3v DC Power		(GPIO_GEN5) GPIO24	18
19	GPIO10 (SPI_MOSI)		Ground	20
21	GPIO09 (SPI_MISO)		(GPIO_GEN6) GPIO25	22
23	GPIO11 (SPI_CLK)		(SPI_CE0_N) GPIO08	24
25	Ground		(SPI_CE1_N) GPIO07	26
27	ID_SD (I2C ID EEPROM)		(I2C ID EEPROM) ID_SC	28
29	GPIO05		Ground	30
31	GPIO06		GPIO12	32
33	GPIO13		Ground	34
35	GPIO19		GPIO16	36
37	GPIO26		GPIO20	38
39	Ground		GPIO21	40

Testing and General commands for GSM

1. Steps to test the GSM Module

We can use the PC Hyper Terminal to interact with the GSM Module.

- First insert the SIM card to the GSM Module,
- Connect the Serial cable –RS232 to the PC via DB9 pin connector on the GSM Module.
- Give the power supply. The power supply indicating LED will be ON continuously.
- Another LED on the Module starts blinking to indicate the availability of network.

  If the network is available then the delay between the blinking is less.

  If the network is not available then the delay between the blinking is more.
- Each GSM modem will have a unique id called IMEI.
- Open Hyper Terminal in the PC , apply the below settings

  Connect using → COM1

  Bits per second → 9600

  Data bits → 8

  Parity → None

  Stop bits → 1

  Flow control → None
- Type AT on Hyper Terminal and press ENTER → OK will be display as a response from the GSM Module.

AT

OK

AT+CGMI - To check Manufacturer Identification

OK

AT+CGMM *MULTIBAND 900 1800 1900*

OK

Command	Description
AT+CGMI	This command gives the manufacturer identification.
AT+CGMM	This command is used to get the supported frequency bands.
AT+CGMR	This command is used to get the revised software version.
AT+CGSN	This command allows the user application to get the IMEI of the product.
AT+CIMI	This command is used to read and identify the IMSI of the SIM card.

GENERAL COMMANDS USED

RF Encoder:

The HT12E encoder is used in RF transmitter module. These ICs are series of CMOS LSIs for remote control system applications. They are capable of encoding 12bit of information which consists of 8 address bits and 4 data bits. Each address and data input is externally programmable or fed in by using switches.

Figure 14- RF Encoder

Some of the features of this encoder are:

- 18-pin DIP
- Operating Voltage: 2.4V ~ 12V
- Low Power and High Noise Immunity, CMOS Technology
- Low Standby Current: 0.1uA (typ.) at VDD=5V
- Minimum Transmission Word = 4
- Built-in Oscillator needs only 5% Resistor
- Data code has positive polarity
- Easy Interface with and RF or an Infrared transmission medium
- Secure and robust protocol
- Ideal for remote control and security applications
- Compatible with the HT12D decoder IC.

RF Decoder:

The HT12D Decoder ICs are series of CMOS LSIs for Remote Control system applications. These ICs are paired with each other. For proper operation a pair of encoder/decoder with the same number of address and data format should be selected (HT12E is paired with HT12D). The Decoder receive the serial address and data, transmitted by a carrier using an RF transmission medium and gives output to the output pins after processing the data.

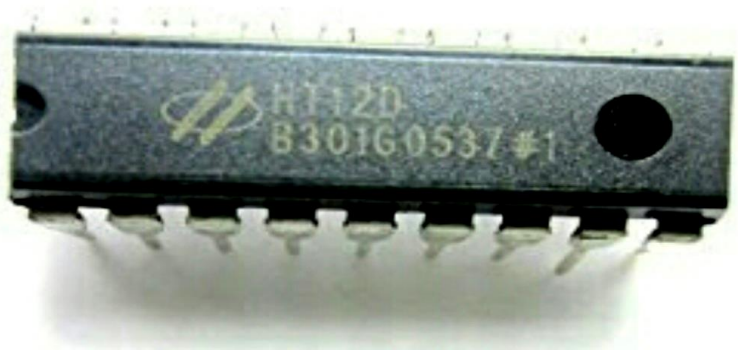


Figure 15- RF Decoder

Some of the features of this decoder are:

- 18-pin DIP
- Operating Voltage: 2.4V ~ 12.0V
- Low Power and High Noise Immunity, CMOS Technology
- Low Stand by Current: 0.1uA (typ.) at VDD=5V
- Capable of Decoding 12 bits of Information
- 8 ~ 12 Address Pins and 0 ~ 4 Data Pins
- Built in Oscillator needs only 5% resistor
- Easy Interface with an RF or an Infrared transmission medium
- Compatible with the HT12E encoder IC

DC Motor

Here the driver circuits are used to control the operations of firing unit, laser unit & audio reception unit present on the robotic module. Here three types of driver circuits are used they are ground driver, laser driver and motor driver circuit.

- 100RPM 12V DC motors with Gearbox
- 6mm shaft diameter with internal hole
- 125gm weight
- Stall Torque = 1.5kgcm torque
- No-load current = 60 mA(Max), Load current = 300 mA(Max)

MOTOR DRIVER CIRCUIT

The Device is a monolithic integrated high voltage, high current four channel driver designed to accept standard DTL or TTL logic levels and drive inductive loads (such as relays solenoids, DC and stepping motors) and switching power transistors. We have used this driver circuit too drive the motors of the robot. Each L293D is used to drive two motors.

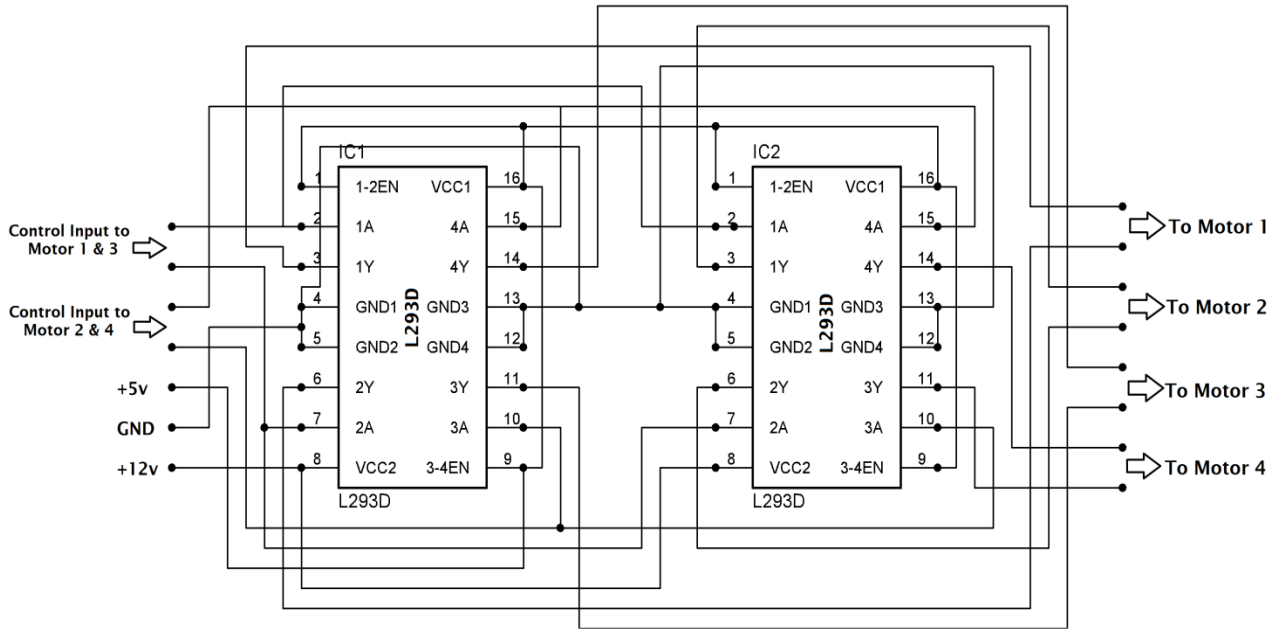


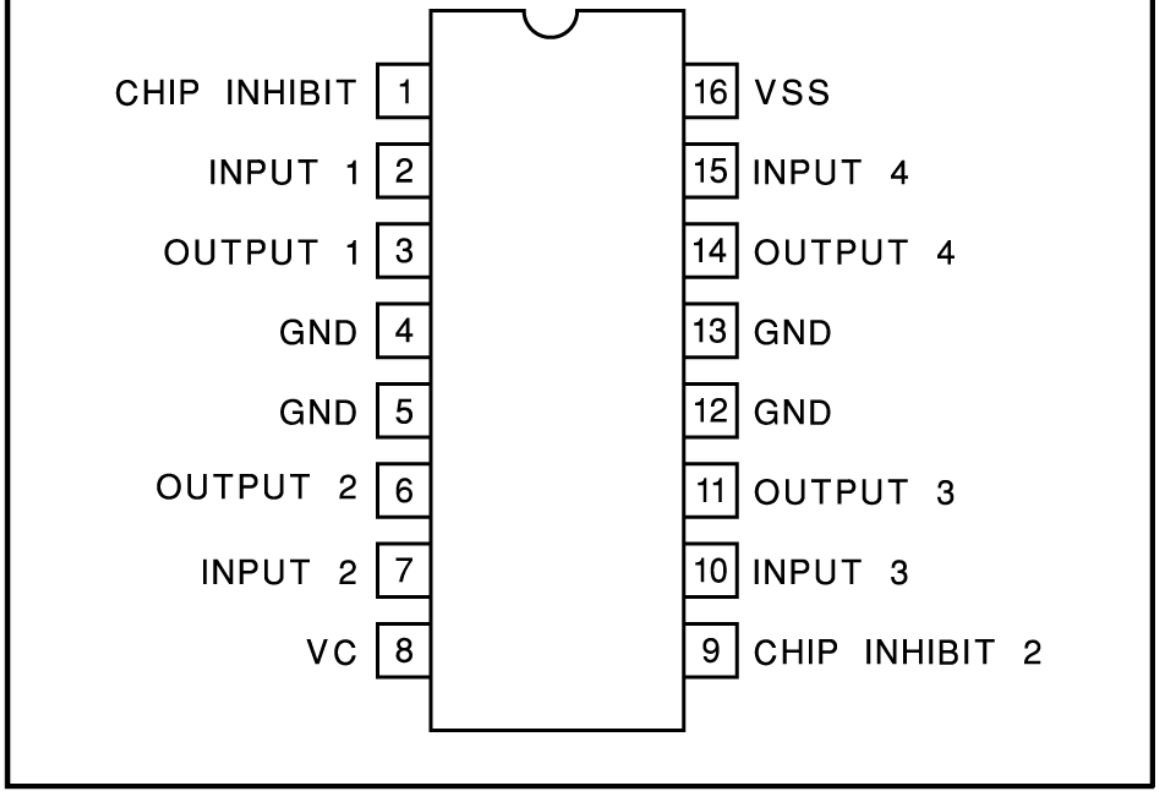
Figure 19- Motor Driver Circuit

Two L293D's are used to drive four motors. When both the inputs are low the motor will be in the halt state, when the first input is high and the second input is low the motor will move in the forward direction, when first input is low and second input is high the motor will move in the reverse direction and when both the inputs are low the motor will be in the halt state.

L293 Motor

CONNECTION DIAGRAMS

DIL-16 (TOP VIEW)
N Package, SP Package



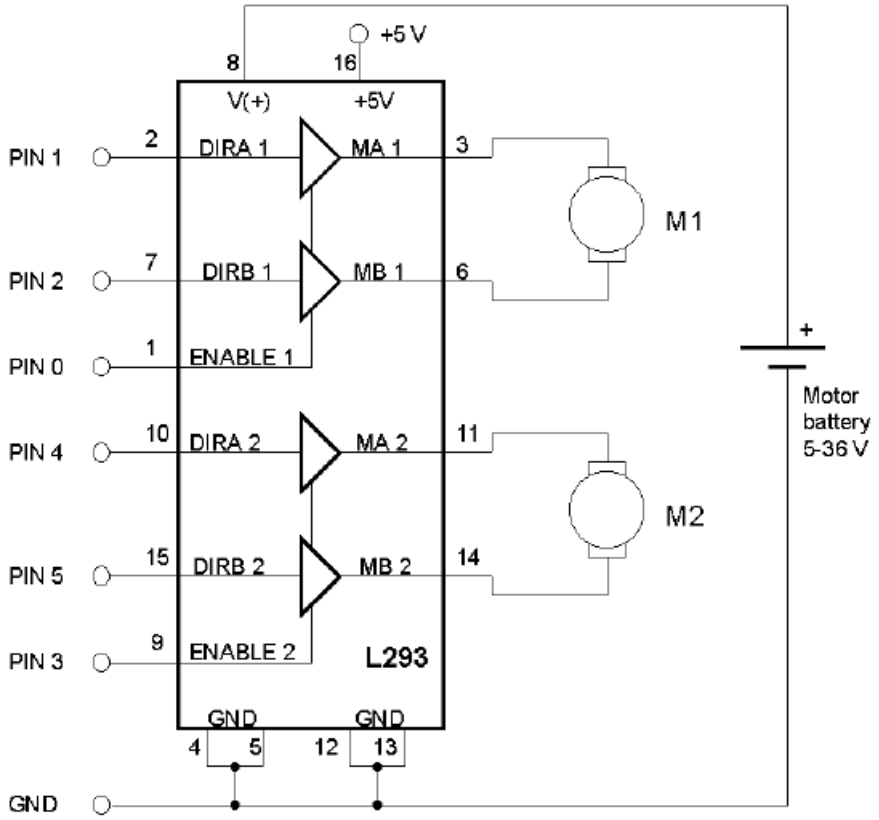
Driver

L293 Motor Driver

The L293 is an integrated circuit motor driver that can be used for simultaneous, bidirectional control of two small motors. Small means small. The L293 is limited to 600 mA, but in reality can only handle much small currents unless you have done some serious heat sinking to keep the case temperature down. Unsure about whether the L293 will work with your motor? Hook up the circuit and run your motor while keeping your finger on the chip. If it gets too hot to touch, you can't use it with your motor.

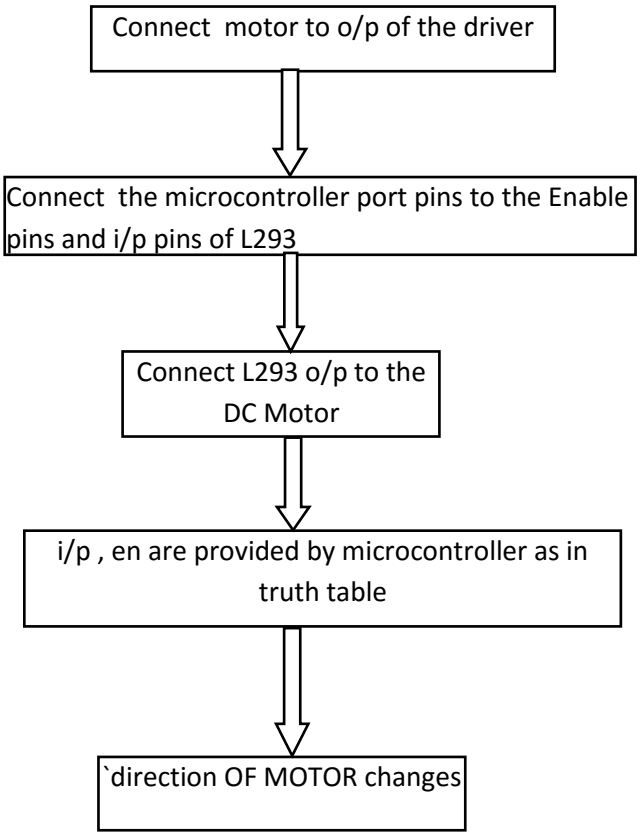
The L293 comes in a standard 16-pin, dual-in line integrated circuit package.

The pinout for the L293 in the 16-pin package is shown below in top view. Pin 1 is at the top left when the notch in the package faces up. Note that the names for pin functions may be slightly different than what is shown in the following diagrams.



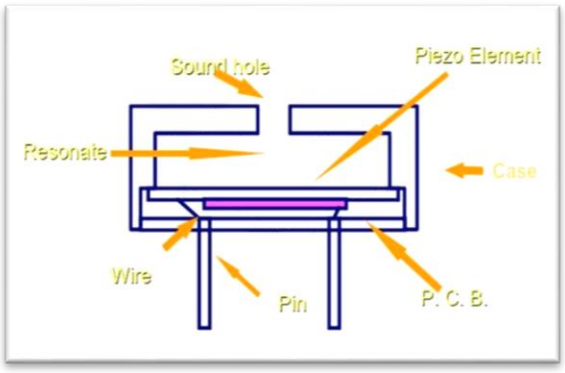
ENABLE	DIRA	DIRB	Function
H	H	L	Turn right
H	L	H	Turn left
H	L/H	H/L	Fast stop
L	either	either	Slow stop

Flow Chart



PIEZOELECTRIC BUZZER

Internal structure of piezoelectric buzzer:



Specifications:

Rated Voltage: A piezoelectric buzzer is driven by square waves (V p-p).

Operating Voltage: For normal operating. But it is not guaranteed to make the minimum SPL under the rated voltage.

Consumption Current: The current is stably consumed under the regular operation. However, it normally takes three times of current at the moment of starting to work.

Capacitance: A piezoelectric buzzer can make higher SPL with higher capacitance, but it consumes more electricity.

Sound Output: The sound output is measured by decibel meter. Applying rated voltage and square waves, and the distance of 10 cm.

Rated Frequency: A buzzer can make sound on any frequencies, but we suggest that the highest and the most stable SPL comes from the rated frequency.

Operating Temp.: Keep working well between -30℃an